etched away in the same chamber in a plasma comprising CF_4.

After etching away the exposed gold and underlying intermediate layer, the photoresist mask is removed in the usual fashion, as by ashing, leaving a precisely formed gold pattern.

The above described method for plasma etching of a gold layer has several advantages over the presently used lift off technique. In essence plasma etching of gold provides better control of the gold geometry and better adhesion. The gold geometry is better controlled because the gold peripheries are precisely defined without lift off irregularities. There is better adhesion of gold to the substrate because the intermediate layer can be deposited on a clean surface free of polymeric residues in a chamber uncontaminated with polymeric residues.

It is to be understood that the above-described embodiments are illustrative of only a few of the many possible specific embodiments which can represent applications of the principles of the invention. For example, while the invention is particularly useful in etching gold on gallium arsenide substrates, it can also be used to etch gold on other substrates such as silicon, ceramics, glass or metal. Thus numerous and varied other arrangements can be devised in accordance with these principles without departing from the spirit and scope of the invention.

I claim:

1. A method for etching a pattern in a gold layer comprising the steps of:

forming a layer of gold on the substrate;

masking the gold layer with photoresist to selectively expose gold in a pattern to be etched; and

etching away the exposed gold by reactive ion etching in a CF_4/O_2 plasma.

2. The method of claim **1** wherein said gold layer is formed on a substrate composing a semiconductor material and said gold layer is formed in a thickness in the range between 100 and 10,000 angstroms.

3. The method of claim **2** wherein said exposed gold is etched by exposing said gold to a plasma formed in a mixture comprising CF_4 and at least 8 molar percent of O_2.

4. The method of claim **1** wherein:

said gold layer is formed on a substrate composing gallium arsenide,

said gold layer is formed in a thickness in the range between 100 and 10,000 angstroms,

and said masked layer is exposed to a plasma formed in a mixture comprising CF_4 and at least 8 molar percent of O_2.

5. The method of claim **4** wherein said gold layer is formed on a substrate comprising a semiconductor material having thereon an intermediate metal layer to facilitate adhesion of the gold layer to the substrate surface.

6. The method of claim **5** wherein said semiconductor material is gallium arsenide and said intermediate metal layer comprises titanium.

7. The method of claim **5** wherein said intermediate metal layer is deposited on a substrate surface essentially free of photoresist residues.

8. The method of claim **5** including the additional step of plasma etching away the portions of said intermediate layer exposed by the etching away of said exposed gold.

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